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167446

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): Douglas Road Landfill Superfund Site		
EPA ID (from WasteLAN): IND980607881		
Region: 5	State: IN	City/County: Mishawaka/St. Joseph
SITE STATUS		
NPL status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
Remediation status (choose all that apply): <input type="checkbox"/> Under Construction <input checked="" type="checkbox"/> Operating <input type="checkbox"/> Complete		
Multiple OUs? * XX YES NO	Construction completion date: <u>9 / 19 / 2000</u>	
Has site been put into reuse? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
REVIEW STATUS		
Lead agency: <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency		
Author name: Dion Novak		
Author title: Remedial Project Manager	Author affiliation: U.S. EPA, Region 5	
Review period: <u>3 / 12 / 2002</u> to <u>8 / 27 / 2002</u>		
Date(s) of site inspection: <u>3 / 26 / 2002</u>		
Type of review: <input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion)		
Review number: XX 1 (first) 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify)		
Triggering action: XX Actual RA On-site Construction at OU # <u>2</u> <input type="checkbox"/> Actual RA Start at OU# <u>NA</u> <input type="checkbox"/> Construction Completion Previous Five-Year Review Report <input type="checkbox"/> Other (specify)		
Triggering action date (from WasteLAN): <u>9 / 30 / 1997</u>		
Due date (five years after triggering action date): <u>9 / 30 / 2002</u>		

Five Year Review Report

**First Five Year Review Report
for
Douglas Road Landfill Superfund Site
Mishawaka, Indiana
St. Joseph County**

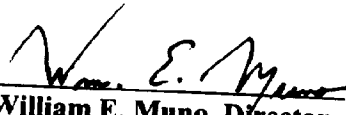
September 2002

PREPARED BY:

**United States Environmental Protection Agency
Region 5
Chicago, Illinois**

Approved By:

Date:


**William E. Muno, Director
Superfund Division**

9/11/02

Executive Summary

The remedy for the Douglas Road Landfill Superfund Site in Mishawaka, Indiana, included three components; the extension of municipal water to approximately 95 homes, the installation of a multi-layer cap, and the construction of a groundwater extraction and treatment system, including the installation of an artificial wetland treatment system for groundwater. The site achieved construction completion with the signing of the Preliminary Close Out Report on September 19, 2000. The trigger for this five-year review was the actual start of on-site remedy construction on September 30, 1997.

The assessment of this five year review found that the remedy was constructed in accordance with the requirements contained in two Records of Decision. The remedy is functioning as designed. Immediate threats have been addressed and the remedy is expected to be protective when groundwater cleanup goals are achieved through extraction and treatment (anticipated to be at least 10 years for the off-site plume and longer for the on-site plume) and when the landfill gas collection system is converted to active collection (September 2002).

Five Year Review Summary Form, cont'd

Issues:

1) Need to convert passive gas collection to active gas collection due to elevated methane readings in site gas monitoring wells

Recommendations and Follow-up actions

- 1) Continue site monitoring activities
- 2) Continue landfill cap operation and maintenance
- 3) Ensure that gas collection system conversion proceeds as designed.
- 4) Continue operating groundwater extraction and treatment system until groundwater cleanup goals are met. Begin to identify and implement opportunities to optimize operation of the groundwater extraction and treatment system.

Protectiveness Statement

The remedy is expected to be protective of human health and the environment upon attainment of groundwater cleanup goals, through active collection and treatment, which is expected to require at least 10 years to achieve in the downgradient area and longer at the site. In the interim, exposure pathways that could result in unacceptable risks have been controlled by the hookup of area residents to municipal water, preventing exposure to, or the ingestion of, contaminated groundwater. All threats at the site have been addressed through the installation of a landfill cap and site perimeter fencing and warning signs, and the implementation of institutional controls. Completion of the gas collection system conversion (September 2002) will eliminate any potential exposure pathways for landfill gas migration.

Long term protectiveness of the remedial action will be verified by obtaining additional groundwater samples to fully evaluate potential migration of the contaminant plume downgradient of the site extraction and treatment system. Current data indicates that the contaminant plume is being contained at the site and the downgradient contaminant plume is decreasing in size and extent. Additional sampling and analysis is ongoing and will be available within the next six months. Current monitoring data indicates that the remedy is functioning as required to meet groundwater cleanup goals.

I. Introduction

The purpose of the five year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five Year review reports. In addition, Five Year review reports identify issues found during the review, if any, and identify recommendations to address them.

The Agency is preparing this Five Year review report pursuant to CERCLA Section 121 and the National Contingency Plan (NCP). CERCLA Section 121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with Section 104 or 106, the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in the NCP; 40 CFR Section 300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The United States Environmental Protection Agency (EPA) Region 5, conducted the Five Year review of the remedy implemented at the Douglas Road Landfill (DLF) Superfund site in Mishawaka, Indiana. This review was conducted by the Remedial Project Manager (RPM) for the entire site from March 2002 to September 2002. This report documents the results of that review.

This is the first five year review for the DLF site. The triggering action for this statutory review is the initiation of the remedial action on September 30, 1997. The five year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

II Site Chronology

6/10/86	Proposed for inclusion on NPL
3/31/89	Finalized on NPL
9/89	State of Indiana and Uniroyal signed a consent decree for performance of a Remedial Investigation/Feasibility Study (RI/FS)
11/91	Uniroyal files for bankruptcy and work ceases at the site
8/94	EPA funded RI begins at the site
7/95	Record of Decision (ROD) for OU 1 calling for a multi-layer landfill cap
5/96	ROD for OU 2 calling for groundwater extraction and treatment through construction of an artificial wetland.
8/94 - 6/96	Extension of city water to approximately 93 homes potentially impacted by groundwater contamination from the site
9/96	Remedial designs for OU 1 and 2 approved by EPA
2/99	Approximately 16 acres of property acquired by the US Army Corps of Engineers on behalf of EPA on which the wetland is to be constructed
2/99 - 11/99	On-site remedy construction
5/00 - 6/00	Regrading and replanting of wetlands
8/00	Installation of filter strip by City of Mishawaka as part of OU 2 discharge design
9/00	Preliminary Close Out Report signed by EPA
3/26/02	Signing of intergovernmental agreement between EPA and City of Mishawaka
3/26/02	Initiation of full scale groundwater extraction system
3/26/02	Five Year Review Site Inspection

III Background

Physical Characteristics

The DLF site is located in St. Joseph County, just north of Mishawaka, Indiana. The site is approximately 16 acres in size and is located near the northwest corner of Douglas and Grape Roads. The site is bounded by the right-of-way for the Indiana State Toll Road to the north, a shopping center and an apartment complex to the east, residential properties and Douglas Road to the south, and agricultural land to the west.

Land and Resource Use

In the early 1950s, the site was excavated and gravel from the site was used for the construction of the interstate. Uniroyal Plastics leased the gravel pit and used it as a repository for plant wastes between 1954 until it was closed in December 1979.

The current land use for the surrounding area is residential and commercial. Juday Creek is used

for fishing. It is anticipated that these land uses will continue into the foreseeable future, with more commercial development occurring. In establishing cleanup requirements, EPA considered the possibility of residential development at the site. The site itself is currently fenced and the landfill contents are contained within the fenced area under an impermeable cap.

The groundwater underlying the site is used as a drinking water source, although because of EPA's extension of city water to area residents, those immediately adjacent to the site are not drinking groundwater. The dominant groundwater flow direction is to the west/southwest towards the St. Joseph River.

History of Contamination

Uniroyal Plastics disposed of all plant wastes at the site from 1954 to 1979. From 1954 to 1971, solvents, fly ash, paper, wood stock, rubber and plastic scrap was disposed at the site. Only fly ash was disposed from 1971 to 1979 when the site was closed to avoid complying with the RCRA regulations.

According to information provided by Uniroyal, about 302,400 gallons of liquid waste were disposed at the site, including methyl ethyl ketone, acetone, tetrahydrofuran, toluene, hexane and xylene. Historical aerial photos of the site indicate several pits containing liquid; the largest was in the central area of the site.

Initial Response

The site was proposed for the National Priorities List (NPL) on June 10, 1986 and finalized on the NPL on March 31, 1989. In September 1994, the results of the RI were made available to the public and potential response actions were discussed for residential well contamination. In April 1995, the proposed plan for OU 1 was released, thus starting the period for public comment. A public meeting was held on April 5, 1995, at which time EPA discussed the proposed remedy for OU 1 and accepted public comment.

On September 13, 1995, EPA held an availability session specifically designed to assist homeowners in completion of the requisite paperwork for eligibility for city water hookup. EPA's proposed plan for OU 2 was released to the public in November 1995 and the public comment period was extended to January 25, 1996, a total of 60 days.

Basis for Taking Action

Contaminants

Hazardous substances that have been released at the site in each media include:

Soil

Dioxin
PCBs
Arsenic
Benzo(a)pyrene
Beryllium
Dibenzo(a,h)anthracene
Bis(2-ethylhexyl)phthalate
Benzo(b)fluoranthene
Benzo(b)anthracene
Chromium
Antimony
Nickel

Groundwater

Arsenic
Vinyl chloride
Trichloroethene (TCE)
Bis(2-ethylhexyl)phthalate
Dibenzo(a,h)anthracene
Indeno(1,2,3-c,d)pyrene
Manganese
Tetrahydrofuran

Exposures to soil and groundwater are associated with significant human health risks, due to exceedances of EPA's risk management criteria for either the average or the reasonable maximum exposure scenarios. The carcinogenic risks were highest for exposures to contaminated groundwater due to high concentrations of vinyl chloride and TCE. Non-carcinogenic risks were highest for exposure to manganese concentrations in groundwater. Risks from exposure to soil were significant due to the presence of dioxin, PCBs, PAHs and bis(2-ethyl hexyl) phthalates.

IV Remedial Actions**Remedy Selection**

The RODs for the DLF site were signed on July 13, 1995 (OU 1) and May 3, 1996 (OU 2). The major components of the remedy for OU 1 include the following:

1. Installation of a composite barrier cap with a geosynthetic clay liner (GCL) soil barrier layer, meeting the requirements of 329 IAC 2-14-19.

2. Collection and disposal of landfill gas
3. Perimeter ditches to collect surface water drainage
4. Groundwater and source area monitoring to ensure that the goals of this action are met

The major components of the remedy for OU 2 include the following:

1. Groundwater extraction using extraction wells or collection drains to contain groundwater in the downgradient direction of the groundwater plume
2. Groundwater treatment through construction of an artificial wetland
3. Re-infiltration of a portion of the extracted groundwater that has undergone treatment in the constructed wetland
4. Discharge to Juday Creek of a portion of the treated groundwater, in compliance with NPDES substantive and administrative requirements for IDEM
5. Groundwater and source area monitoring to ensure that the goals of this action are met and that downgradient water supplies are not adversely impacted by groundwater contamination
6. Long term operation and maintenance of the remedy to ensure protection of public health and the environment

Institutional controls are required for the DLF property in the form of deed restrictions to limit the use of the site for construction or other site development and to prohibit the use of groundwater under the site for any purpose. Access restrictions are required for the site in the form of fencing to restrict site access and warning signs to state the potential hazards posed by the site.

The property that the wetland has been constructed on was acquired by the United States as part of this remedial action. The actual site property was abandoned by the site trustee in accordance with the terms of a Stipulation and Order (Case No. 91-33364 HCD) and EPA and IDEM were granted perpetual site access to construct and operate and maintain the site remedy by this stipulation and order.

Remedy Implementation

The remedial action took place in three phases. The first phase consisted of the extension of city water from the cities of Mishawaka and South Bend to 93 homes. This action was undertaken as a time critical emergency removal action from August 1994 until completion in June 1996.

The second phase consisted of all other remedial activities. From February 1999 to November 1999, the following remedy components were constructed;

Groundwater extraction and treatment with artificial wetland system:

- clearing and grubbing of entire site
- installation of five groundwater extraction wells
- installation of 14 additional groundwater monitoring wells (site total of 36)
- excavation of four wetland cells
- rough and final grading of wetlands area
- liner placement in wetland cells
- earth backfill in wetland cells
- wetlands planting with cattails and bullrush plants
- seeding of wetlands area

Landfill cap system:

- regarding of landfill site in preparation for capping
- gas collection vent installation
- installation of GCL liner and polyvinyl chloride (PVC) liner
- excavation of surface water drainage trenches
- placement of cap cover soils

From May 2000 to June 200, the following activities occurred:

- Regrading of wetlands area and replanting of wetlands plants that did not survive initial planting in 1999
- Drainage trench repair and seeding of landfill cap
- replacement of site fencing
- installation of site access roads.

In August 2000, the following activities occurred:

- Installation of filter strip by the City of Mishawaka that will convey shared discharge to Juday Creek
- Operation and maintenance of filter strip and entire storm sewer system constructed by the City of Mishawaka

The site achieved construction completion status when the PCOR was signed on September 19, 2000.

EPA and the State have determined that all RA construction activities, including the implementation of all necessary institutional controls, were performed in accordance with specifications. It is expected that cleanup levels for groundwater contaminants in the offsite area will have been reached in approximately 10 years. It is anticipated that cleanup levels for groundwater at the site will take many years to achieve beyond the 10 year period. After groundwater cleanup levels have been met, EPA will issue a Final Close Out Report.

System Operation/Operation and Maintenance (O&M)

Primary activities associated with site O&M include:

- Measure and record flow rate and total flow from the flowmeter for each extraction well
- Inspect, record, and adjust water levels for the wetland cells and infiltration basin
- Remove debris buildup from influent and effluent piping, stop logs, and stormwater management facilities
- Inspect the Juday Creek filter strip to ensure it is free of any obstructions
- Examine the condition of pumps
- Inspect and characterize wetland vegetation-replant as needed
- Inspect structural integrity of berms and perimeter ditches
- Perform regular management of berm vegetation
- Inspect all fences and gates for integrity
- Inspect, control, and remove nuisance plant and animal species
- Inspect landfill cap integrity and mow 1/3 of the cap yearly
- Remove deposited mineral material and sediment from piping
- Monitoring of progress of remediation by sampling 36 site monitoring wells and 5 on-site extraction wells
- Monitoring of extracted groundwater (influent) and treated effluent
- Collection of surface water, sediment, fish tissue, and invertebrate tissue samples
- Monitoring of landfill gas for methane

Initially, only one of the site extraction wells was operated, beginning in August 1999. This was to help establish the wetland planting and acclimate the wetland system. Approximately 11 million gallons of water were extracted from EXT-5 from August 1999 to December 2000. From December 2000 to September 2001, approximately 85 million gallons of water were extracted. See Figure 1 for a map locating the monitoring and extraction well network for the site.

Operation of EXT-3 was initiated in April 2001 and approximately 38 million gallons of water were extracted between April and September 2001. EXT-5 is located off-site in the residential area to the southwest and is at the downgradient edge of the off-site groundwater contamination plume. EXT-3 is located immediately downgradient of the on-site infiltration basin.

During this time, no water was discharged off-site while an intergovernmental agreement (IGA) was being finalized. The IGA memorialized an agreement between the City of Mishawaka and EPA Region 5 whereby the City would construct a storm sewer along Douglas Road as part of the road widening project and in return, EPA would discharge treated water from the DLF site through the sewer towards ultimate discharge to Juday Creek. The City would also be responsible for long term operation and maintenance of the sewer system. In March 2002, this agreement was finalized and full system operation was commenced.

Other issues associated with remedy performance included the sedimentation of the infiltration basin due to wetlands planting and flooding of the site during 2000. This sedimentation was

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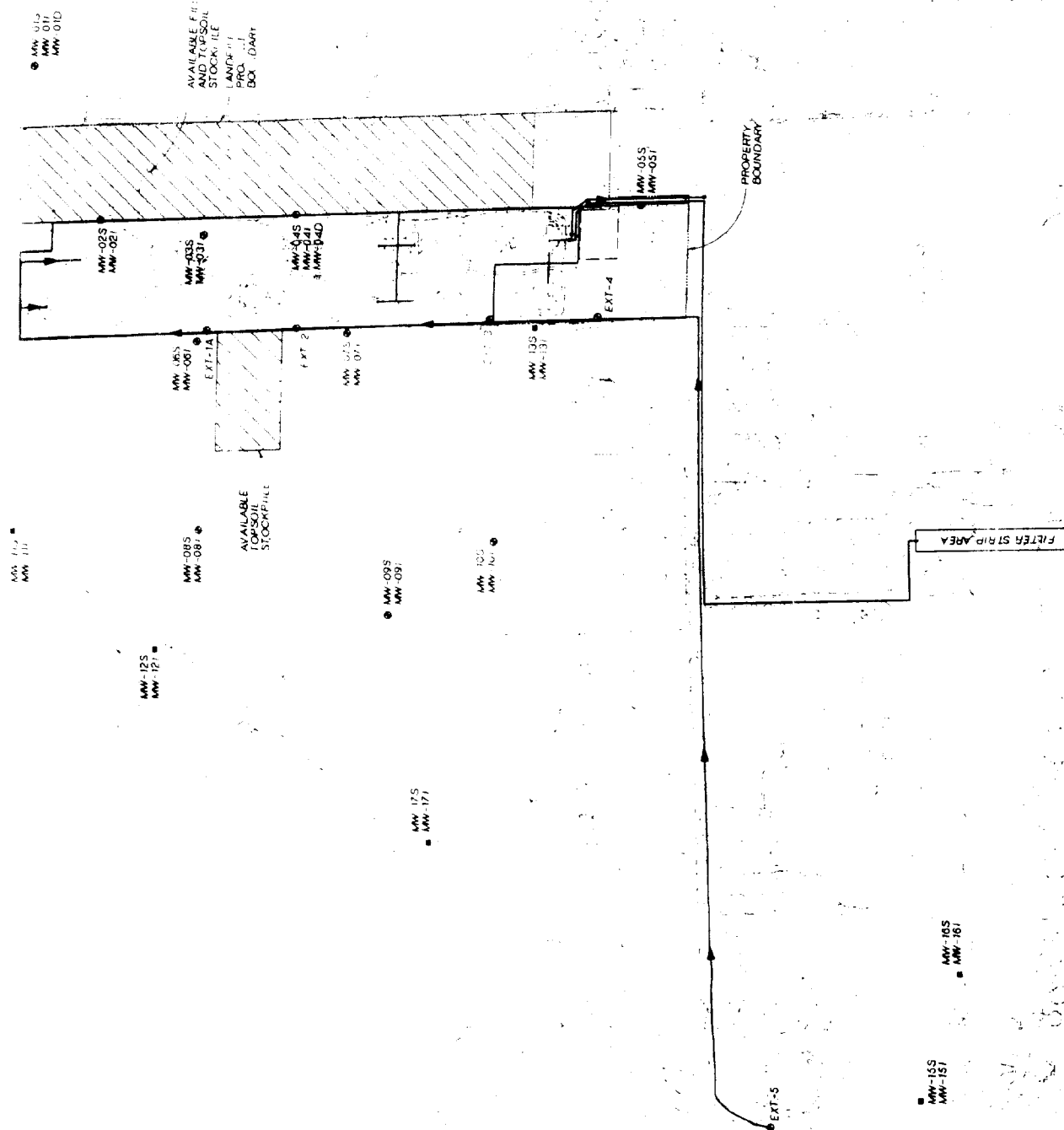


FIGURE 1
GROUNDWATER MONITORING WELL
EXTRACTION WELL LOCATIONS
DOUGLAS ROAD AND HILL
ST. JOSEPH COUNTY, INDIANA

found to be impacting the basin infiltration design capabilities and these sediments were removed in March 2001. In addition, algae was being found to clog up the grates transferring water between wetland cells after construction. Algae treatment was conducted twice to remedy the problem which did not result in a long term solution and wooden piers were installed at the wetland cells in the spring of 2000 to allow personnel to directly remove the algae during regular site O&M.

During the construction of the remedy, on-site flooding led to problems with the landfill drainage ditches eroding, impacting their effectiveness at diverting surface runoff away from the landfill cap. This was addressed by the installation of erosion control matting in the ditches, which has eliminated the erosion problem.

System data is being collected to monitor the system now that full scale operation has commenced. This data will be summarized in the annual O&M report scheduled to be submitted to the Agency in October 2002.

Another currently evolving issue is that elevated levels of methane are being detected in a portion of the 18 on-site gas monitoring probes. The levels of methane vary with season and in early 2002, EPA directed the contractor to begin monitoring monthly at the gas probes. Monthly monitoring of methane levels has confirmed that methane levels are exceeding the remedy performance standard of 5%. In June 2002, EPA directed the contractor to take the necessary steps to convert the landfill gas collection system from passive to active. This entails the construction of an on-site building with an active blower to actively collect the landfill gas, with provisions to monitor system effluent and add a treatment component utilizing activated carbon if determined to be necessary based on sampling results. This construction and system modification will commence in September 2002 and the modified gas collection system will begin operating immediately thereafter. In addition, off-site gas monitoring will also be performed in September/October 2002 to assess current off-site gas conditions.

O&M costs were estimated in the RODs to be approximately \$250,000 annually for both remedial components. In the first two years of operation, O&M costs have been slightly lower. This is not anticipated to change substantially when the active gas collection system goes online.

V. Progress Since the Last Five-Year Review

This is the first five year review for the site.

VI Five Year Review Process

Administrative Components

The Five Year review team was led by Dion Novak, RPM for the Douglas Road Landfill Site, and included Dan Plomb, EPA contractor for the DLF site. Kevin Herron from IDEM assisted in the review as the representative for the support Agency.

From March 2002 to September 2002, the review team established the review schedule whose components included:

- Site Inspection
- Document review
- Data review
- Five Year Review Report Development and Review

Community Involvement

A press release was sent to the community in September, 2002, announcing that the Five Year Review report for the DLF site was underway, that a completed review would be available at the end of September, 2002, and that the results of the review and the report would be available to the public at the site repository at the Mishawaka-Penn public library, at EPA Region 5 offices, and online at www.epa.gov/region5/superfund/fiveyear/fyr_index.html.

Document Review

This five year review consisted of a review of relevant site documents including the 2001 Long Term Remedial Action Performance report, which listed all monitoring data collected at the site. Applicable groundwater cleanup standards, as listed in the 1996 ROD, were reviewed.

Data Review

Groundwater monitoring

Groundwater monitoring has been conducted at the site since the beginning of the Remedial Investigation in 1994. In general, the highest level of contaminants in groundwater was detected at that time. Since the extension of city water and the onset of extraction system operations, levels have decreased significantly in most wells.

Total VOCs from monitoring wells MW-01 to MW-10 has decreased from a high concentration of approximately 16,600 parts per billion (ppb) to approximately 240 ppb in May 2001 (See Table 1). Most of this decrease is attributed to a decrease in the concentration of tetrahydrofuran from 15,000 ppb in 1994 to 160 ppb in 2001.

Table 1
Concentrations of Total VOCs in groundwater

Sample Location	May 1994 (ppb)	Aug 1994 (ppb)	Nov 1999 (ppb)	Nov 2000 (ppb)	May 2001 (ppb)	
MW-03S	16,595	6,035	61.6*	1,328	228.6	
MW-04S	13.0	14.0	20.2	dry	dry	
MW-06S	18.0	36.0	10.4	No access	no access	
MW-09S	0	5.0	9.9	9.0	7.6	
MW-10S	1.0	6.0	ND	1.6	1.6	
MW-11S	NI	NI	110	110	84	
MW-13S	NI	NI	14.4	5.6	51	
MW-14I	NI	NI	4.9	1.2	ND	
MW-14S	NI	NI	4.8	ND	ND	
MW-17I	NI	NI	2.1	1.2	6.9	
Total	16,627.0	6,096.0	238.3*	1456.6	379.7	

* Not analyzed for tetrahydrofuran, which was 15,000 ppb in May 1994, 5,900 ppb in August 1994, 1,200 ppb in November 2000, and 160 ppb in May 2001

NI-not installed yet

ND-not detected

Table 2
Groundwater VOCs exceeding remediation goals from 1996 ROD (ppb)

Sample Location	Contaminant	ROD perf std	May 1994	August 1994	Nov 1999	Nov. 2000	May 2001
MW-03S	1,2 Dichloro-ethane	1.0	16J	3J	ND	ND	1.8
MW-03S	Benzene	2.8	55	25J	9.6	31	19
MW-13S	Vinyl Chloride	1.0	NI	NI	ND	ND	2.8

J-estimated quantity NI-not installed yet ND-not detected

As demonstrated in Table 2, there are still several wells that contain groundwater contamination at levels above the ROD performance standards. Well MW-03S and MW-13S are located on the site but as is demonstrated in the aforementioned table, these levels have decreased significantly since 1994 and it is anticipated that as the extraction system continues to operate, these levels will continue to decrease.

Table 3
Groundwater Arsenic exceeding remediation goals from 1996 ROD

Sample location	ROD perf std	Aug 1994	Nov 1999	Nov 2000	May 2001
MW-03S	5	24.8	35	25	28
MW-04S	5	10.8	13	dry	dry
MW-04I	5	1.0	ND	7.2	8.5
MW-06S	5	15.3	26	no access	no access
MW-09S	5	9.6	14	14	14
MW-10S	5	8.4	ND	6.7	5.5
MW-15S	5	NI	ND	5.4	3.0

NI-not installed yet

ND-not detected

The 1996 ROD contained an effluent discharge standard for arsenic of 5 ppb after groundwater treatment. Levels of arsenic in groundwater have remained relatively constant during the five year review period but as anticipated by the ROD, appear to be decreasing slightly in the last several monitoring events. The ROD anticipated that the placement and operation of the landfill cap would help to minimize groundwater mixing with landfill contents, mobilizing arsenic into the groundwater. Because cap construction was only completed in September 2000, future groundwater results are anticipated to continue this downward trend.

As shown below however (Table 3), wetlands effluent has consistently met the ROD performance standard for arsenic discharge. Monitoring at the site will continue and these levels will continue to be assessed over time.

System Effluent sampling

Table 3
Analytical results for wetlands treatment system (ppb)

Sample date	TCE influent	effluent	Arsenic influent	effluent	Lead influent	effluent
10/4/00	6.3*	BDL	1.1	BDL	BDL	BDL
10/19/00	4.7	BDL	BDL	BDL	BDL	BDL
11/2/00	6.2*	BDL	BDL	1.4J	BDL	5.3
11/28/00	NS	BDL	NS	8.0	NS	23J
12/28/00	4.2	1.8	1.0	3.9	BDL	14
2/6/01	3.7	2.4	1.9	1.5	BDL	BDL
2/27/01	1.8	1.7	BDL	1.0	BDL	BDL
4/19/01	2.0	BDL	1.2	1.4	BDL	BDL
5/22/01	2.9	BDL	1.5	2.8	BDL	BDL
6/22/01	2.9	BDL	NS	3.6	NS	BDL
7/31/01	3.4	BDL	1.3	2.2	BDL	BDL
8/28/01	3.6	BDL	BDL	1.6	BDL	BDL
9/25/01	2.2	BDL	BDL	BDL	BDL	BDL

*exceeds ROD performance standard of 5.0 ppb NS-not sampled J-estimated quantity
BDL-below laboratory detection limit

Surface Water and Sediment monitoring

Three sampling locations on Juday Creek, one upgradient of the site discharge location, one at the discharge location, and one downgradient of the discharge location are monitored annually. Samples are collected from surface water, sediment, and fish and invertebrate tissue and community structure to analyze present conditions and to gauge any impacts site discharge is having on Juday Creek quality.

General water quality parameters for Juday Creek are within acceptable standards for the protection of aquatic life (IAC Title 327, Article 2). Measured values have shown consistent trends since August 1996 and have varied little among sampling locations.

No VOCs or SVOCs were detected in surface water samples. Seven metals were detected but these parameters were generally within water quality criteria, standards or benchmarks.

Landfill Gas Monitoring

Table 4
Landfill Gas Methane Monitoring Results

Gas Well	Nov 2000	May 2001	Dec 2001	Feb 2002	Mar 2002	Apr 2002	May 2002	June 2002	July 2002	Aug 2002	
1	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
2	0.0	0.0	0.0	0.3	0.0	0.0	0.2	0.0	0.0	0.1	
3	0	0	0	0	0	0	0	0	0	0	
4	0	0	0	0	0	0	0	0	0	0	
5	0	0	0.6	0.6	0	0	1.5	0	3.9	12.8	
6	0	0	2.2	0	0	0	0	0	0	0.4	
7	0.1	0.6	9.6	1.5	0	0	3.8	0.1	4.5	12.3	
8	22.8	0.2	21.9	5.8	0.2	0.9	7.1	0.6	21.6	27	
9	0.2	0.4	3.8	1.6	0.2	0	1.1	2.0	4.2	6.7	
10	>99	7.8	87	25.5	7.5	10.9	27.1	2.7	47.7	98.8	
11	0	0	0	0.6	0	0	0.2	0	0	0.4	

12	0	0	0	0.3	0	0	0.2	0	0	0.2	
13	0	0	0	0.4	0	0	0.1	0	0	0.1	
14	0	0	0	0.1	0	0	0.1	0	0	2	
15	0.1	0.1	6.8	3.4	0.7	0.1	1.6	0.3	0.9	0.	
16	2.0	1.5	72.6	49.8	17.0	10.6	33.7	0.0	49.7	92	
17	0	0.5	7.0	7.1	3.7	0	4.6	1.5	12.3	20	
18	0	0	0.6	0.3	0	0	0.1	0	0	1.2	

Methane lower explosive limit is 5% and the upper explosive limit is 15%

Table 4 lists methane gas monitoring data collected since the landfill cap construction was completed. In February, 2002, EPA initiated monthly sampling at the landfill gas probes due to slightly elevated levels of methane detected at some locations (See Figure 2 for well locations). This monthly monitoring has continued and will continue for some time. Landfill gas samples were also collected in March, 2002, and analyzed for volatile organic constituents. None were detected at levels that would require active treatment pursuant to State of Indiana regulations.

The landfill cap construction included a gas collection system that was designed and built with passive collection that could easily be converted to active collection if required. EPA has directed it's contractor to convert the system to active gas collection-this will be completed during September, 2002.

Site Inspection

An inspection at the site was conducted on March 26, 2002 by the RPM, the EPA contractor and EPA's O&M contractor. The purpose of the inspection was to assess the protectiveness of the remedy, including the presence of fencing to restrict access, the integrity of the cap, and the condition of the constructed wetlands.

No significant issues have been identified at any time regarding the landfill cap, the drainage structures, or the site fencing other than the methane gas detections mentioned earlier. A slight problem with minor accumulations of garbage along the eastern fence line was jointly addressed and resolved between EPA and the manager of the adjacent apartment complex.

VII Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

The review of documents, ARARs, risk assumptions, and the results of the site inspections indicate that the remedy is functioning as intended by the ROD. The stabilization and capping of

FIGURE 2

1/15/05, rev 2000, hgs dgm

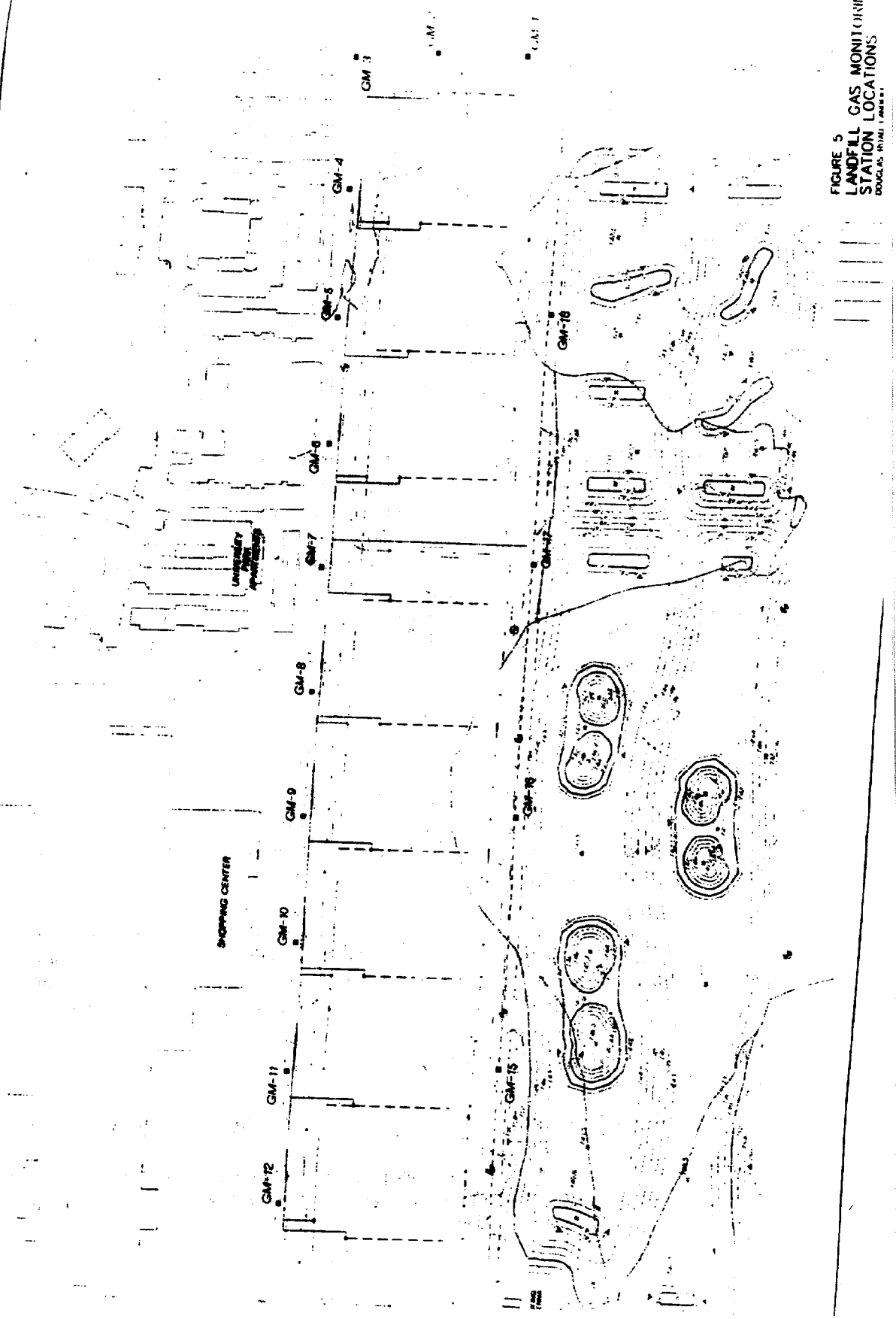
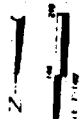


FIGURE 5
LANDFILL GAS MONITORING
STATION LOCATIONS
DOUGLAS HWY 14000

contaminated soils has achieved the remedial action objectives to minimize the migration of contaminants to groundwater and prevent direct contact with, or ingestion of contaminants in soil at the site. Site access has been restricted with fencing and signage, as outlined in the ROD. EPA is pursuing the imposition of deed restrictions on the site property and it is anticipated that by the next five year review, appropriate restrictions will be in place.

Operation and maintenance of the cap and drainage systems has, on the whole, been effective. One-third of the cap cover grasses are mowed each year and all cap remedy components are intact and performing as designed. Landfill gas exceedances at a portion of the gas monitoring wells have initiated a change to the gas extraction and monitoring network. The landfill gas system was designed to passively vent landfill gas unless monitored gas concentrations indicated that active gas collection was required. The system was designed and constructed to allow for this changeover. Conversion of the gas collection system from passive to active will include the installation of a blower building on-site and the collection of additional gas data during and after construction. This is anticipated to begin in early September and be completed by the end of September, 2002 and its completion will prevent any further gas migration issues. O&M annual costs are slightly lower than initial estimates.

Because the groundwater extraction system has only been fully operational since March 2002, there were no opportunities for system optimization during this review. The system has been partially operational since late 2000, operating well below capacity to keep the wetlands plants fully sustained with no groundwater being discharged off-site.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Changes in standards and To Be Considereds

There have been no changes in the ROD performance standards during this period.

Changes in Exposure Pathways

There have been no changes in exposure pathways since the RODs were signed.

Changes in Toxicity and other Contaminant Characteristics

There have been no changes in contaminant characteristics during this reporting period that would impact remedy protectiveness.

Changes in Risk Assessment Methods

There have been no changes in risk assessment methods that would impact remedy protectiveness.

Expected progress towards meeting RAOs

The size of the contaminant plume has decreased since the operation of the groundwater extraction system has begun. The remedy performance is progressing as expected and it is anticipated that off-site contamination levels will achieve cleanup levels in approximately 10 years. Once off-site groundwater cleanup levels are achieved, operation of EXT-5 would no longer be necessary. This will be monitored in accordance with the site O&M plan.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No ecological targets were identified during the baseline risk assessment and none were identified during the five year review, and therefore, monitoring of ecological targets is not necessary. Juday Creek monitoring has not shown any site related impacts during annual monitoring events. No weather related events have affected the remedy protectiveness. There is no other information that calls into question the protectiveness of the remedy.

Technical Assessment Summary

According to the data reviewed and the site inspections, the remedy is functioning as intended by the RODs. There have been no changes in the physical conditions of the site that would impact the effectiveness of the remedy. As outlined above, the landfill gas collection system is being changed over from passive to active collection, eliminating the potential for on-site gas exceedances to migrate away from the site-this will be completed in September, 2002.

On and off-site groundwater contamination levels are decreasing over the reporting period since the groundwater extraction system became operational. Treatment effluent has consistently met ROD discharge standards since the initiation of extraction system operations.

There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment, and there have been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

Fencing and warning signs were installed as part of remedy construction and are currently in place at the site and functioning as designed. Deed restrictions will be pursued to satisfy the ROD requirements. On-site access is limited by the fencing and the site was officially abandoned by the bankruptcy trustee several years ago but EPA will pursue placement of these

deed restrictions. The remedies at the site have mitigated any short term or direct contact risks from site contamination so the remedies are protective in the short term.

VIII Issues

Issue	Currently affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Exceedances of methane performance standards at gas collection wells	Y	N*
Placement of deed restrictions limiting site development and use of groundwater	N	Y**

* will be remedied by the activation of landfill gas collection system in September 2002

** anticipated to be in place by the second five year review for the site

IX Recommendations and Follow-up Actions

<u>Issue</u>	<u>Recommendations/ Follow-up Actions</u>	<u>Party Responsible</u>	<u>Milestone Date</u>	<u>Affects Protectiveness(Y/N)?</u>	
				<u>Current</u>	<u>Future</u>
Methane exceedances	Install active gas collection system	EPA	9/02	Y	N
Deed Restrictions	Pursue restriction on property deed	EPA	12/03	N	Y

X Protectiveness Statement

The remedy is expected to be protective of human health and the environment upon attainment of groundwater cleanup goals, through active collection and treatment, which is expected to require at least 10 years to achieve in the downgradient area and longer at the site. In the interim, exposure pathways that could result in unacceptable risks have been controlled by the hookup of area residents to municipal water, preventing exposure to, or the ingestion of, contaminated groundwater. All threats at the site have been addressed through the installation of a landfill cap and site perimeter fencing and warning signs, and the process of implementing institutional controls will begin shortly. Completion of the gas collection system conversion (September 2002) will eliminate any potential exposure pathways for landfill gas migration.

Long term protectiveness of the remedial action will be verified by obtaining additional groundwater samples to fully evaluate potential migration of the contaminant plume

downgradient of the site extraction and treatment system. Current data indicates that the contaminant plume is being contained at the site and the downgradient contaminant plume is decreasing in size and extent. Additional sampling and analysis is ongoing and will be available within the next six months. Current monitoring data indicates that the remedy is functioning as required to ultimately meet groundwater cleanup goals.

Deed restrictions will be pursued on the landfill and wetlands property to prevent future site development or use of groundwater. These restrictions do not impact short term protectiveness of site remedies but are required by the ROD. EPA will pursue current ownership issues for the landfill portion of the site to begin the process of placing deed restrictions and will immediately begin the process of placing restrictions on the wetlands portion of the site, which is owned by the United States.

XI Next Review

The next five year review for the DLF site is required by September, 2007, five years from the date of this review.